EXPEDITED PROCEDURE – EXAMINING GROUP 3737

S/N 10/685,226 **PATENT**

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Gil M. Vardi et al.	Examiner: Ali Imam
Serial No.:	10/685,226	Group Art Unit: 3737
Filed:	October 14, 2003	Docket No.: 1599.003US2
Title:	OPTICAL-ACOUSTIC IMAGING DEVICE	

AMENDMENT & RESPONSE UNDER 37 C.F.R. 1.116

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Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

In response to the Final Office Action dated January 13, 2006, please amend the application as follows:

IN THE CLAIMS

Please amend the claims as follows.

1. (Currently Amended) An imaging device to be introduced into a body for internally imaging a portion of the body, the device comprising:

an elongate member including proximal and distal ends; and

an acoustic-to-optical transducer located on the elongate member away from the proximal end of the elongate member, wherein the elongate member includes a sufficiently small diameter and sufficient rigidity to permit use for introducing [[an]] a separate ancillary device into the body.

2. (Original) The device of claim 1, in which the elongate member includes at least one optical fiber.

3. (Original) The device of claim 2, in which the optical fiber includes a damped silica fiber.

4. (Original) The device of claim 1, in which the acoustic-to-optical transducer includes a Bragg grating sensor.

5. (Original) The device of claim 4, in which the elongate member includes at least one optical fiber, and in which the Bragg grating sensor is formed in a core of the optical fiber.

6. (Original) The device of claim 5, in which the Bragg grating includes a length, in a longitudinal direction of the elongate member, that is at least 200 times an optical wavelength of light passing through the core of the optical fiber.

7. (Original) The device of claim 4, in which the Bragg grating sensor includes a variable period.

8. (Original) The device of claim 7, further including a tunable laser, optically coupled to the Bragg grating sensor including the variable period, the laser operable to adjust an effective location of the Bragg grating sensor by adjusting a wavelength of light to select a desired portion of the Bragg grating sensor that provides a corresponding desired period.

9. (Original) The device of claim 1, further comprising an electrical-to-acoustic transducer, at least a portion of the electrical-to-acoustic transducer located away from the proximal end of the elongate member.

10. (Original) The device of claim 9, in which the electrical-to-acoustic transducer includes a piezoelectric transducer.

11. (Original) The device of claim 10, in which the elongate member includes at least one optical fiber, and in which the piezoelectric transducer includes a circumferential jacket about at least a portion of the optical fiber.

12. (Original) The device of claim 9, further comprising an electrical driver, coupled to the electrical-to-acoustic transducer.

13. (Original) The device of claim 12, in which the electrical driver is operable to couple an approximately 40 megahertz electrical signal to the electrical-to-acoustic transducer.

14. (Original) The device of claim 1, in which the elongate member includes at least one aperture.

15. (Original) The device of claim 14, in which the at least one aperture has a length, in a longitudinal direction of the elongate member, of approximately between about 151 microns and about 200 microns.

16. (Original) The device of claim 14, in which the elongate member includes a plurality of apertures disposed in a spiral pattern along the elongate member.

17. (Original) The device of claim 1, in which the elongate member is biocompatible and has a diameter of less than about 1 millimeter.

18. (Original) The device of claim 1, in which the elongate member is biocompatible and has a diameter of less than about 0.5 millimeters.

19. (Original) The device of claim 1, in which the elongate member is biocompatible and has a diameter of less than about 0.2 millimeters.

20. (Cancelled)

21. (Original) The device of claim 1, in which the elongate member comprises at least one optical fiber, the fiber including a core and a cladding about at least a portion of the core.

22. (Original) The device of claim 21, in which a diameter of the cladding varies longitudinally along the elongate member.

23. (Original) The device of claim 22, in which the diameter of the cladding varies periodically.

24. (Original) The device of claim 22, in which the diameter of the cladding varies periodically with a period that is approximately equal to an acoustic wavelength in water.

25. (Original) The device of claim 22, in which the diameter of the cladding varies periodically with a period that is approximately equal to a quasi-Lamb wavelength in the optical fiber.

26. (Original) The device of claim 21, in which the cladding includes a plurality of beads separated from each other by filler regions of lower acoustic impedance than the beads.

27. (Original) The device of claim 26, in which the beads are substantially formed from silica.

28. (Original) The device of claim 26, in which the filler regions are substantially formed from at least one of a polymer, a gel, and a fluid.

29. (Previously Presented) The device of claim 21, further comprising a piezoelectric jacket about at least a portion of the optical fiber, at least a portion of the piezoelectric jacket operating as an electrical-to-acoustic transducer.

30. (Original) The device of claim 29, in which the piezoelectric jacket is substantially formed from polyvinyldiene fluoride (PVDF).

31. (Original) The device of claim 21, in which the jacket is shaped as a spiral about the optical fiber in a longitudinal direction of the elongate member.

32. (Original) The device of claim 29, in which the jacket includes a plurality of ribs.

33. (Original) The device of claim 29, further including:
a cylindrical strength member about at least a portion of the jacket; and
a cylindrical sheath about at least a portion of the cylindrical strength member.

34. (Previously Presented) The device of claim 1, in which the elongate member includes an acoustic signal collecting lens.

35. (Original) The device of claim 1, further including a laser operatively coupled to the elongate member.

36. (Original) The device of claim 1, further including an electrical generator operatively coupled to the elongate member.

37. (Currently Amended) A method comprising:

introducing an elongate imaging device into a body, wherein the elongate member includes a sufficiently small diameter and sufficient rigidity to permit use for introducing [[an]] a separate ancillary device into the body;

delivering acoustic energy from a portion of the device that is located within the body;

receiving, within the body, acoustic energy reflected from the body;

transducing, within the body, the received acoustic energy into an optical signal; and

communicating the optical signal to a location outside of the body.

38. (Original) The method of claim 37, further comprising forming an image of a region within the body using the optical signal that was communicated to a location outside of the body.

39. (Previously Presented) The method of claim 37, comprising:

introducing a catheter over the elongate imaging device; and

guiding the catheter to a desired location using the elongate imaging device.

40. (Original) The method of claim 37, in which the transducing includes using a Bragg grating.

41. (Previously Presented) An imaging device for being introduced into a body for imaging an internal portion of the body, the device comprising:

an elongate member including proximal and distal ends; and

means, located on the elongate member, for performing acoustic-to-optical transducing using an acoustic-to-optical transducer located on the elongate member, in which the acoustic-to-optical transducer includes a user-selectable longitudinal location.

42. (Currently Amended) A device for imaging comprising:

a guidewire, the guidewire comprising;

an optical fiber;

a piezoelectric jacket; and

at least one Bragg grating sensor; and

wherein the optical fiber is at least partly coated with the piezoelectric jacket, and where the at least one Bragg grating is contained within the optical fiber, and wherein the profile of the device is less than 1 millimeter in diameter, and wherein the guidewire has sufficient rigidity to permit introducing [[an]] a separate ancillary device into the body using the guidewire.

43. (Original) The device of claim 42, further comprising a strength member, wherein the strength member includes at least one aperture.

44. (Original) The device of claim 42, wherein the device is an intravascular guidewire.

45. (Original) The device of claim 42, wherein the device is sized and shaped for being used for intravascular imaging in conjunction with catheterization.

46. (Original) The device of claim 42, wherein the device is sized and shaped for being used for intravascular imaging at least one of before, during, or after catheterization.

47. (Original) The device of claim 42, wherein the optical fiber comprises silicon oxide and the piezoelectric jacket comprises poled polyvinyldiene fluoride.

48. (Previously Presented) The device of claim 41, in which the acoustic-to-optical transducer includes a Bragg grating with a variable period.

49. (Previously Presented) The device of claim 48, further including a tunable laser, optically coupled to the Bragg grating sensor including the variable period, the laser operable to

adjust an effective location of the Bragg grating sensor by adjusting a wavelength of light to select a desired portion of the Bragg grating sensor that provides a corresponding desired period.

50. (Previously Presented) The device of claim 41, in which the elongate member has sufficiently small diameter and sufficient rigidity to permit introducing an ancillary device into the body using the elongate member.

51. (Previously Presented) The device of claim 50, in which the elongate member is an intravascular guidewire that is sized and shaped for being used for real-time intravascular imaging in conjunction with catheterization.

52. (Previously Presented) The device of claim 41, further comprising a strength member, wherein the strength member includes at least one aperture.

REMARKS

This responds to the Office Action dated on January 13, 2006. Claims 1, 37, and 42 are amended. No claims are cancelled or added. As a result, claims 1-19, 21-52 remain pending in this patent application.

This response incorporates by reference the remarks of Applicant's previous response, which was entered on October 17, 2005, and which are omitted here, for brevity.

Double Patenting Rejection

Claims 1-19 and 21-52 were rejected under the judicially created doctrine of double patenting over claims 1-16 of U.S. Patent No. 6,659,957. Applicant respectfully submits that because the claims have not been indicated to be otherwise allowable, it is premature to address the question of whether the present claims meet the requirements for a double patenting rejection. Accordingly, Applicant will consider whether to traverse or submit a terminal disclaimer to obviate this rejection when the claims are otherwise indicated to be allowable.

§102 Rejection of the Claims

Claims 1-19 and 21-52 were rejected under 35 U.S.C. § 102(b) for anticipation by Riza (U.S. 5,718,226). Applicant respectfully traverses.

Concerning claims 1-19, 21-40 and 42-52:

Applicant cannot find in the cited portions of Riza any disclosure of an elongate member that includes (1) a sufficiently small diameter and (2) sufficient rigidity, to permit use for introducing a "separate" ancillary device (such as a separate catheter) into the body, as presently similarly recited or incorporated in claims 1-19, 21-40 and 42-52. Applicant respectfully submits that the Office Action's interpretation of Riza's ultrasonic transmitter and receiver as the ancillary device does not constitute a "separate" ancillary device. Instead, Riza's transmitter and receiver appear to be part of the same elongate member (probe) and, therefore, cannot possibly constitute a separate ancillary device.

By contrast the above-cited claims presently recite or incorporate an elongate member that includes a sufficiently small diameter and sufficient rigidity to permit introducing a separate ancillary device (for example, a separate catheter) into the body. In such an embodiment, the claimed device is capable of producing real time images during vascular intervention procedures using an entirely separate catheter, such as before insertion of the separate catheter and throughout the separate catheterization procedure (*See* Application at page 4). Such images are useful for properly performing such procedures involving a separate catheter, which may provide additional interventional functionality.

Moreover, Applicant respectfully submits that the present claim amendments are fully supported by the present patent specification as filed, and do not introduce any new matter that could require any additional search or consideration. For example, certain previously pending claims (e.g., claim 42) already include the use of the term "guidewire," which Applicant respectfully submits would be understood by one of ordinary skill in the art as being capable of introducing a "separate" device, such as a separate catheter. Accordingly, Applicant respectfully submits that the amended claims are allowable over the art of record in their present form without raising any new issues that would require any further consideration.

Concerning claim 41 and 48-52:

Applicant cannot find in the cited portions of Riza any disclosure of an acoustic-to-optical transducer that includes "a user-selectable longitudinal location," as recited or incorporated in these claims.. For example, the present patent application explains how using a variable period Bragg grating sensor allows use of a tunable laser to select a particular desired portion of the Bragg grating sensor for imaging a corresponding nearby region of tissue or the like. (*See, e.g.,* Application at page 8). Because the cited portions of Riza apparently do not disclose all of the subject matter of claims 41 and 48-50, Applicant respectfully requests withdrawal of this basis of rejection for these claims.

Moreover, with respect to these remarks concerning claims 41 and 48-52, Applicant respectfully notes that these remarks were submitted in Applicant's previous response, however, the Final Office Action has not addressed such previously-submitted remarks. Accordingly, Applicant respectfully submits that Applicant's remarks have apparently not been fully considered, and Applicant respectfully requests withdrawal of the finality of the rejection of claims 41 and 48-52 to afford Applicant adequate opportunity to respond.

Reconsideration of Previous Response and of Finality of the Rejection

Applicant's previous response included certain remarks pointing out various patentably distinct individual features of various claims (*e.g.*, claims 3, 6, 7, 8, 9-13, 14-16, 22-28, 29-32, 33, 34, 36, 37-39, 41, and 48-50. However, the Final Office Action failed to respond to these remarks. The Final Office Action has not explained where such patentably distinct features are found in the relied-upon Riza reference. Therefore, there is presently no evidence of record to support a rejection of such claims. Moreover, Applicant respectfully submits that the because the examination of such claims has not considered and responded to such remarks, Applicant has been denied a full and fair opportunity to respond to the apparently arbitrary rejection of such claims. As such, Applicant respectfully submits that the rejection is inappropriate, and the finality of the present rejection is premature. Applicant respectfully requests withdrawal of the present rejection, withdrawal of the finality of the present rejection, full consideration of all remarks previously submitted in Applicant's previous response (such remarks are omitted here, for brevity), and that Applicant be given a full opportunity to respond to the same.

Request for Telephonic Interview

If all claims are not found to be allowable, Applicant respectfully requests the opportunity for a telephonic interview by Applicant's counsel, Suneel Arora, who can be reached at 612-373-6951.

CONCLUSION

Applicant respectfully submits that the claims are in condition for allowance and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicant's attorney (612) 373-6951 to facilitate prosecution of this application.

If necessary, please charge any additional fees or credit overpayment to Deposit Account No. 19-0743.

Respectfully submitted,

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Date of Deposit: March 13, 2006
This paper or fee is being filed on the date indicated above using the USPTO's electronic filing system EFS-Web, and is addressed to the Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.